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(54) A ROLLER FOR GUIDING A MOVABLE WEB

WALZE ZUM FÜHREN EINER BEWEGLICHEN WARENBAHN

ROULEAU DE GUIDAGE D'UNE BANDE MOBILE

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Description

[0001] This invention relates to a rotating roll in accordance with the preamble of claim 1.

[0002] Previously known is a spreader roll used in context with paper machine calendars, by means of which the travel of paper web can be guided. The roll comprises three cylinders side by side, each cylinder individually fitted with bearings on a support axle running through all three of them. However, the farthest cylinders are so fitted with the bearings that the outmost bearings can be moved slightly sideward from the centre line of the support axle. By means of this shifting the three-component roll becomes a construction where the midmost roll is rotating totally around the support axle centre line, but the farthest rolls can be adjusted into a slightly deflected position, whereby the whole roll axis of rotation is a broken line, but only with a slight change of direction. The bearings used in the farthest rolls have been ball bearings and adjustment has been possible in moving another journal box.

[0003] A roll of this type adjusted to be curving like a broken line and whose cylinders are of steel, has slots between the adjacent cylinders when the farthest rolls have been adjusted. Even though packings are used in the slots, bearing grease easily trickles out from them onto the paper. The metal roll tube also gets heated at the bearings leaving marks on the paper. Further, by this construction a poor impact tensing and spreading the paper web is produced due to clear points of discontinuity. It is explicitly meant to spread the web sideward by the roll before entering the calendar by making the roll middle portion to tense the web at the most and the roll edges less tensing. In making the roll of three or more adjacent cylinders, the tensing effect can be produced only as a broken-line-like profile across on which the paper web moves.

[0004] Further known from the GB-publication 1 332 926 and US patent 3,783,481 is a rotating roll fitted with bearings on a curved non-rotating axle. In these solutions it is difficult to install several bearings one after another on a curved axle and it is not possible to adjust the curvature of the axle. A curved axle, as such, is also difficult to manufacture.

[0005] US-patent 4,470,183 forming the preamble of present claim 1 discloses a roll guiding the travel of a paper web. The roll comprises a rotatable mantle portion and a non-rotating shaft portion. The shaft is supported on a frame. A bushing is mounted around the smaller end part of the shaft, which by means of a bearing is in force transmitting contact with the mantle portion of the roll. The inner end of the bushing is pivotally connected to the shaft by means of a pivot bearing. At the other end of the bushing there is a deflection-adjustment screw, which is connected to the end part of the shaft by threads. At least a portion of the mantle will rotate eccentrically with respect to the centre line of the support construction. The mantle of the roll can be divided

into separate parts mounted axially one after the other.

[0006] With a roll according to this invention a remarkable improvement of the roll profile and adjustability has been achieved and the slots between the elements in a multielement roll have been omitted.

[0007] The main characteristics of the invention are presented in the characterizing portion of claim 1.

[0008] The objective of the invention is to eliminate the discontinuities from the roll and this is reached in using reinforced plastic as roll material or a similar composite construction, of which a uniform mantle is made fitted from its ends and most suitably also between them with thrust bearings. The proposed material allows rotation around a slightly curved rotation axis. During rotation the mantle is subjected to alternating stress due to continuous bending. Since in used rolls the required deflection is small, for instance in a six meter roll the deflection of the centre at the roll end is appr. 1 cm, by which such a small spreading during roll rotation is produced that it does not exceed the spreading value of 0,1% permitted for the mantle material.

[0009] An adjustment carried out with a roll as per this invention is ideal for paper web. For a standard sized roll a curved and continuous profile is produced on the line where the web touches the roll. Furthermore, the roll is light and inexpensive to manufacture. The mantle curvature can be easily adjusted and fitting with bearings is easily done on one straight or on several straight axles.

[0010] In the following the invention is disclosed with reference to the enclosed drawing, where

Fig. 1 is a side section of the roll

Fig. 2 is a side section of the roll, second embodiment

Fig. 3 is a side section of the roll, third embodiment

[0011] Figure 1 shows roll 1 of composite construction with a mantle tube 1. The mantle is cylindrical with a standard sized diameter. Within the mantle there is an axle 2, known as such, which is not rotated and which is propped in its position. Axle 2 is not moved during adjustment by means of which the outer profile of the roll is altered. The middle portion of the axle has an enlargement in order to improve its sturdiness. Mantle 1 is a uniform tube.

[0012] In figure 1, as an example, one end of the roll is illustrated fitted with an adjustable bearing support different from the one in the other roll end. In both ways it is possible to make the rotation centre of the farthest bearing deflected from the centre of support axle 2.

[0013] In the solution to the left is the end of bushing 5 that supports bearing 4 fitted by a support joint 8 to support axle 2 inside roll 1. Bushing 5 partly extrudes from the roll and by means of adjusting screw 7 the rotation centre of bushing 5 and as well as of bearing 4 is deflected from the support axle centre. The rotation centre of the bearing is on curved line 12 presenting simu-

lataneously the centre line of the bent roll. Bushing 5 must fit firmly in place on axle 2 which means that in addition to adjusting screw 7 bushing 5 must be made immobile by other supporting means as soon as the proper adjustment status has been determined.

[0014] The embodiment to the right in figure 1 shows how bushing 5 is fixed on axle 2 by means of ball joint 3. In this case the rotation of bushing 5 is most suitably prevented by means of adjusting screws 7 running through axle 2.

[0015] As per figures 1, 2 and 3 mantle 1 of many meters length and supported by four bearings is curved by adjusting the outermost bearing supports into an externally even curvation without any spots of discontinuity. The curvations in practice are so small that a mantle of composite construction can take completely the existing bending stress. During rotation, by each rotation, the mantle must bend twice over a straight line in both directions, i.e. once to the tensile stress state and once to the compression state. The mantle is affected by alternating stress which, however, may not exceed the permitted spreading value of 0,1%, i.e. the limit given for composite materials.

[0016] Figure 2 shows a roll of composite construction with a mantle tube 1. The mantle is cylindrical with a diameter of standard size. Mantle 1 is a uniform tube. The roll construction rests on two firm axles 2a and 2b.

[0017] In the embodiment to the left in figure 2 bushing 5 is a bearing solution fastened by joint 8 that includes a fulcrum pin to axle 2a within mantle 1. The pin of joint 8 goes through axle 2a so that its both ends reach bushing 5. There is at end a reinforcing ring 13 with housings for both pin ends. By means of screw 7 bushing 5 can be turned with respect to axle 2a, whereby bearings 4 form a pair of power bending the mantle tube. The rotation centre of bearings 4 is on curved line 12 presenting simultaneously the centre line of the bent mantle.

[0018] The attachment of bushing 5 to axle 2 can be improved in using similar extra screws installed beside screw 7. Screws turnable from differing directions from bushing 5 against support axle 2a can be used.

[0019] The embodiment to the right in figure 2 shows how bushing 5 is fixed to axle 2b by means of a ball joint 3. In this case the rotation of bushing 5 is most suitably prevented by means of adjusting screws 7 through axle 2b.

[0020] In figure 3 bushings 5 are directly fixed to fastenings 14, 15, 16, 17, 18 at the roll ends. The fastenings keep the bushings non-rotating but allow turning them around joint 15 in order to bend the mantle. The arrangement is turned activating bracket 16 by means of a force. A proper way is, for instance, to convey a screw force to bracket 16 turning screw 18, whereby bushings 5 also retain their accurately adjusted angle-position when part 14 is locked and made immobile by the screw.

[0021] The mantle material is of glass fibre construction or of carbon fibre epoxy composite construction, which makes the mantle light and inexpensive to man-

ufacture. The paper web moving on the mantle rotates the mantle and the tension force of the paper web works as mantle load, the tension force being relatively small, only a few hundred of Newtons per metre.

Claims

1. A roll guiding the travel of a paper web, especially in a paper machine, having at least a portion of its mantle tube (1) eccentrically rotatable with respect to the centre line of a supporting construction, and having adjustable, non-rotating cylinder elements, like bushings (5), at both ends of the mantle tube (1), further having an axle (2; 2a, 2b) or a fastening body (17) as supporting construction and a joint (8; 15) between each cylinder element and the said supporting construction for adjustment of the direction of said cylinder element with respect to the centre line of said supporting construction, so that the cylinder element becomes deflectable with respect to the centre line of the supporting construction by using a mechanical adjusting element, for instance screw (7; 18), characterized in that the mantle tube is uniform and of reinforced plastic material or of a similar composite construction and that two bearings (4a, 4b) are fitted at a distance from each other on each cylinder element between the cylinder element and the mantle tube to rotate the mantle tube (1).
2. A roll according to patent claim 1 characterized in that said cylinder elements (5) are deflected with respect to another cylinder element within mantle tube (1), like axle (2), using a mechanical adjusting element, for instance screw (7), to carry out deflection.
3. A roll according to patent claim 1 characterized in that cylinder elements (5) are deflected with respect to firm axles (2a, 2b) reaching from both ends into the roll using a mechanical adjusting element, for instance screw (7), to carry out deflection.
4. A roll according to patent claim 1 characterized in that cylinder elements (5) are deflected in supporting the cylinder elements by a supporting structure outside the roll comprising a joint (15) in the fastening body (17) for turning the element (5) and a turning mechanism (16), (18), for instance using screw (18), to carry out deflection of element (5) and fixing the element in the adjusted position.

Patentansprüche

1. Walze zum Führen des Laufs einer Papierbahn, insbesondere bei einer Papiermaschine, mit zumin-

dest einem Abschnitt ihrer Mantelröhre (1), der in Bezug auf die Mittellinie eines Stützaufbaus exzentrisch drehbar ist, und mit einstellbaren nicht drehenden Zylinderelementen wie beispielsweise Hül-
sen (5) an beiden Enden der Mantelröhre (1) und des Weiteren mit einer Achse (2; 2a, 2b) oder einem Befestigungskörper (17) als ein Stützaufbau und einem Gelenk (8; 15) zwischen jedem Zylinderelement und dem Stützaufbau für ein Einstellen der Richtung des Zylinderelementes in Bezug auf die Mittellinie des Stützaufbaus derart, dass das Zylinderelement in Bezug auf die Mittellinie des Stützaufbaus unter Verwendung eines mechanischen Einstellelementes wie beispielsweise eine Schraube (7; 18) ablenkbar wird,

dadurch gekennzeichnet, dass

die Mantelröhre gleichförmig ist und aus einem verstärkten Kunststoffmaterial oder einem ähnlichen Verbundaufbau besteht und

zwei Lager (4a, 4b) bei einem Abstand voneinander an jedem Zylinderelement zwischen dem Zylinderelement und der Mantelröhre eingesetzt sind, um die Mantelröhre (1) zu drehen.

2. Walze gemäß Patentanspruch 1, dadurch gekennzeichnet, dass

die Zylinderelemente (5) in Bezug auf ein anderes Zylinderelement innerhalb der Mantelröhre (1) wie die Achse (2) unter Verwendung eines mechanischen Einstellelementes wie beispielsweise eine Schraube (7) abgelenkt werden, um eine Ablenkung auszuführen.

3. Walze gemäß Patentanspruch 1, dadurch gekennzeichnet, dass

Zylinderelemente (5) in Bezug auf feste Achsen (2a, 2b), die von beiden Enden in die Walze hineinreichen, unter Verwendung eines mechanischen Einstellelementes wie beispielsweise eine Schraube (7) abgelenkt werden, um eine Ablenkung auszuführen.

4. Walze gemäß Patentanspruch 1, dadurch gekennzeichnet, dass

Zylinderelemente (5) beim Stützen der Zylinderelemente durch einen Stützaufbau außerhalb der Walze abgelenkt werden, die ein Gelenk (15) in dem Befestigungskörper (17) für ein Drehen des Elementes (5) und einen Drehmechanismus (16, 18), der beispielsweise eine Schraube (18) verwendet, aufweist, um eine Ablenkung des Elementes (5) auszuführen und um das Element in der eingestellten Position zu fixieren.

bande de papier, en particulier dans une machine à papier, dont au moins une partie du tube de protection extérieur (1) peut tourner de manière excentrique par rapport à l'axe d'une construction de support, et comprenant des éléments cylindriques non rotatifs, réglables, comme des douilles (5), situés aux deux extrémités du tube de protection extérieur (1), et comprenant en outre un axe (2 ; 2a, 2b) ou un élément de fixation (17), formant une construction de support et une articulation (8 ; 15), placé entre chaque élément cylindrique et ladite construction de support (10, 12) pour permettre le réglage de la direction dudit élément cylindrique par rapport à l'axe de ladite construction de support, afin que l'élément cylindrique puisse être dévié par rapport à l'axe de ladite construction de support en utilisant un élément de réglage mécanique, par exemple une vis (7 ; 18), caractérisé en ce que le tube de protection extérieur est uniforme et constitué d'une matière plastique renforcée ou d'une construction composite analogue et en ce que deux paliers (4a, 4b) sont placés à une certaine distance l'un de l'autre sur chaque élément cylindrique entre l'élément cylindrique et le tube de protection extérieur (1) afin de faire tourner ce dernier.

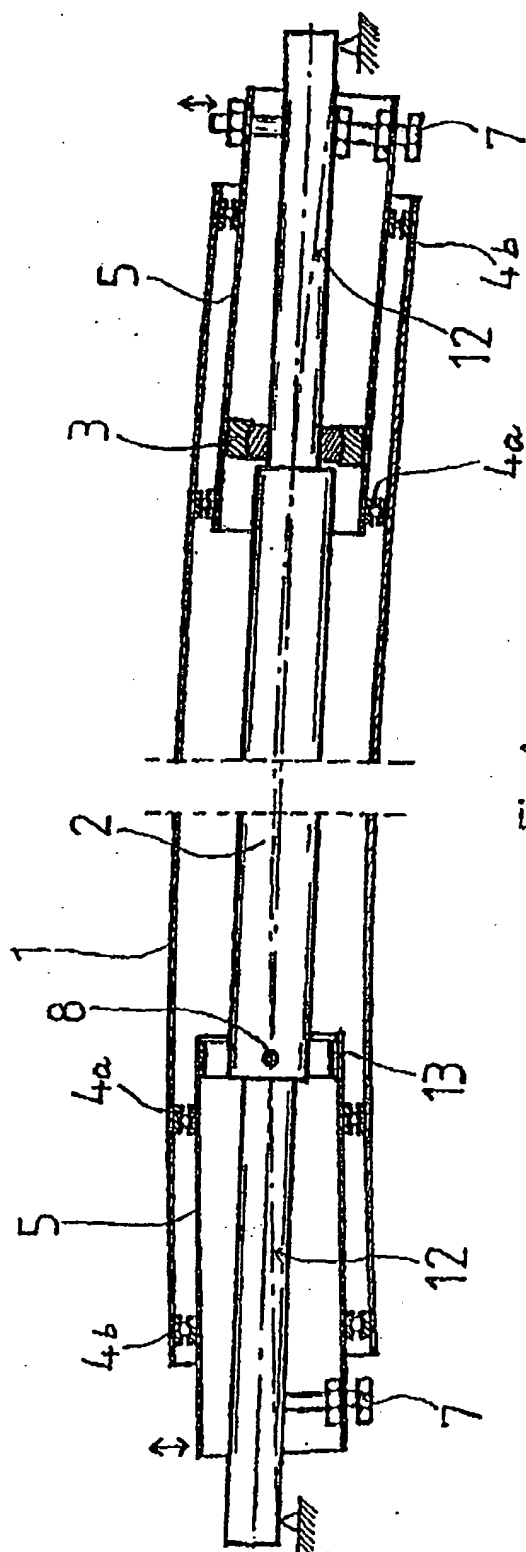
2. Rouleau selon la revendication 1, caractérisé en ce que lesdits éléments cylindriques (5) sont déviés l'un par rapport l'autre dans le tube de protection extérieur (1), comme l'axe (2), en utilisant un élément de réglage mécanique, par exemple une vis (7), pour exécuter la déviation.

3. Rouleau selon la revendication 1, caractérisé en ce que les éléments cylindriques (5) sont déviés par rapport aux axes fixes (2a, 2b) pénétrant dans le rouleau depuis les deux extrémités en utilisant un élément de réglage mécanique, par exemple une vis (7), pour exécuter la déviation.

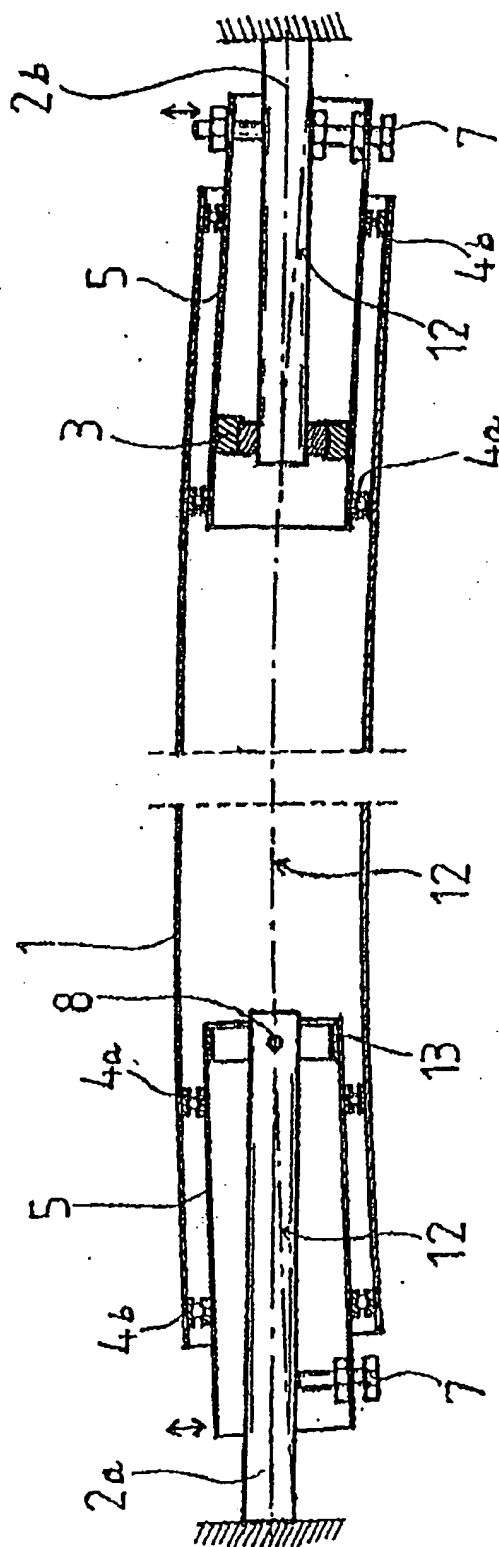
4. Rouleau selon la revendication 1, caractérisé en ce que les éléments cylindriques (5) sont déviés du fait qu'ils sont supportés par une structure de support à l'extérieur du rouleau comprenant une articulation (15) dans l'élément de fixation, (17) pour faire tourner l'élément (5) et un mécanisme tournant (16), (18), utilisant par exemple une vis (18), pour exécuter la déviation de l'élément (5) et fixer l'élément dans la position réglée.

Revendications

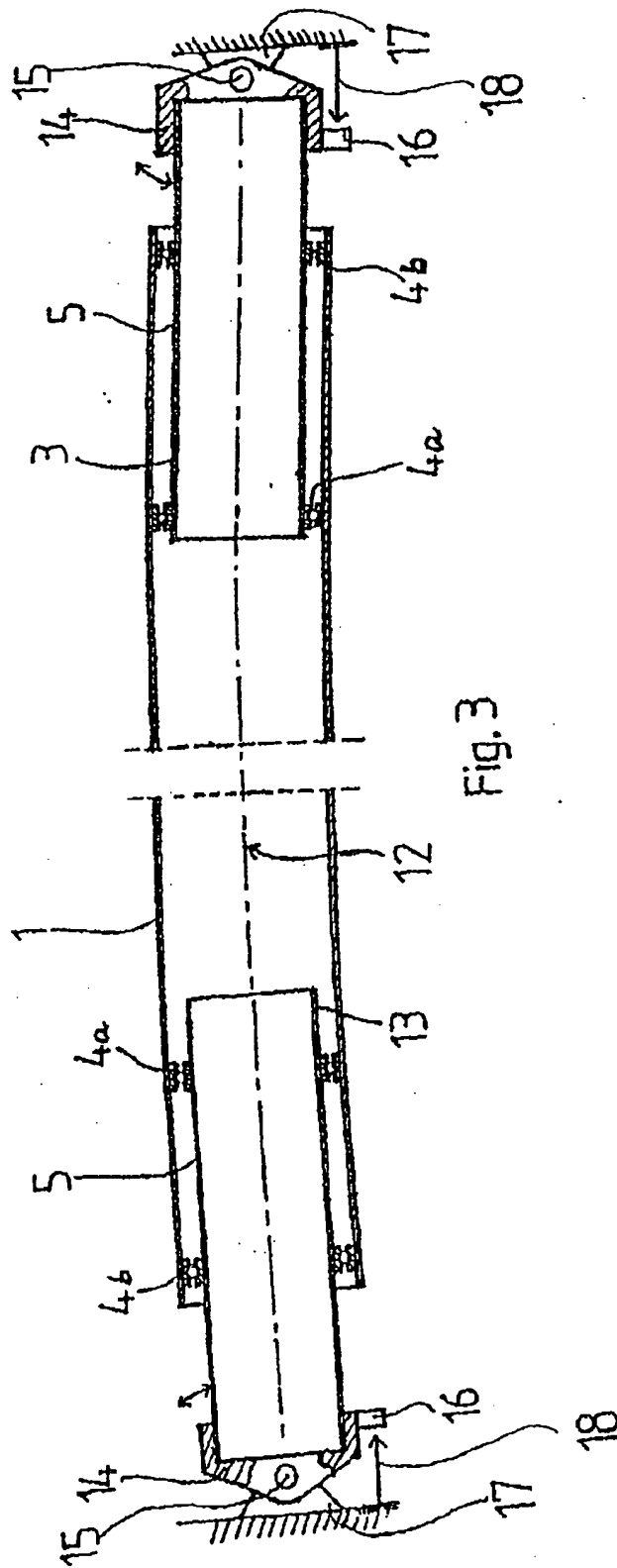
1. Rouleau destiné à guider le déplacement d'une



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